RJM Corporation
Ten Roberts Lane
Ridgefield, CT 06877
203 438-6198

September 25, 1991

Mr. Aaron Nissen
Intermountain Power Services Corporation
850 West Brush Wellman Road
Delta, UT 84624

Ref: Airflow Balancing
RJM Proposal No. 910614

Dear Mr. Nissen:

The above referenced proposal for air distribution balancing can be modified as follows:

1. Baseline Air Distribution Analysis - $34,300.00

2. Burner Balancing - $300.00/burner/test

The baseline air distribution analysis is a fixed-fee price and is a required prerequisite for any balancing work.

Please note that at the conclusion of a balancing program, another complete 48 burner test is required to assure that all burners meet the balancing criteria. This post balancing test will be conducted at the $300.00/burner/test rate. Also, the above costs are exclusive of any sales, excise or other taxes which if applicable, your company has agreed to pay.

IPSC will be informed of the need for balancing and how many burners are out of specification at the conclusion of the baseline testing. IPSC can then make a determination at that time whether or not to continue with the balancing program.

Very truly yours,

Richard J. Monro
President

RJM/sv
Anipscab.ltr

RJM Corporation
Ten Roberts Lane
Ridgefield, CT 06877
203 438-6198

6487

RJM

FACSIMILE TRANSMITTAL COVER SHEET

DATE: 9/25/91 **FAX NO.:** _____

Please deliver the following pages to:

COMPANY: IPSC **NAME:** Aaron Nissen

REFERENCE: Proposal No. 910614

THIS FAX IS FROM: Richard J. Monro

Number of pages 2 (including cover sheet) transmitting from Xerox Telecopier 7032 (telephone 203 431-8255)

MESSAGE:

If you do not receive all the pages, please call back as soon as possible. 203-438-6198.

MEMORANDUM

INTERMOUNTAIN POWER SERVICE CORPORATION

TO: S. Gale Chapman

FROM: Dennis K. Killian

DATE: September 27, 1991

SUBJECT: Burner Air Flow Balancing on Unit 2

FILE: 01.12.02, IGS91-3

Please approve the attached purchase requisition for secondary air flow balancing thru the burners on Unit 2 during the Fall 1991 Outage. This Outage is scheduled to begin October 28, 1991. RJM Corporation will conduct the testing and provide diagnostics for shrouding the outer air registers and for back plate positioning on the inner air registers. **Total estimated cost for the burner air flow testing and balancing is $70,400.**

IPSC is recommending the burner air flow balancing to aid in the resolution of concerns with the burner setup and their operation. It is part of the on-going program for burner improvements. Burner improvement related contracts include: the RJM Design Evaluation of B&W's Burner, RJM Flame Stabilizers Purchase as an attachment to Unit 2's burners, and Purchase of new B&W Redesigned Burners.

IPSC will be responsible for the installation of the shrouding required for balancing the outer air registers. RJM will provide technical support on the installation. IPSC will also be responsible for mechanical and technician support of the testing.

Please reference the attached purchase requisition, burner air flow balancing specification, plus RJM's Proposal #910614 dated June 17, 1991.

Please contact Jerry Hintze or Aaron Nissen if you have further questions concerning this matter.

AEN:
Attachments

BURNER AIR FLOW BALANCING SPECIFICATIONS:

1.0 SCOPE OF WORK

1.1 The Contractor shall provide testing and diagnostic services to balance secondary air flow to individual burners on a burner row basis. Both the inner (spin) and outer air zones shall be tested, balanced and retested to verify acceptance criteria.

Intermountain Generating Station, Unit 2, will be made available at the end of its Fall Outage for testing and balancing purposes. Unit 2's Outage begins October 28, 1991 and a block of five days are tentatively scheduled for testing and balancing activities (reference attached schedule).

1.2 The Contractor shall provide technical support and manpower for two test crews to conduct simultaneous air flow testing.

IPSC will provide technical support for the test crews of one person per crew.

Outage time is of the essence. To be able to conduct the testing, balancing and retesting, multiple crews and shifts will be utilized to obtain desired results. A window of five days is being provided during the Outage to complete all testing and balancing activities.

Work shifts maybe scheduled day or night and of ten to twelve hour duration to accommodate outage and testing activities. IPSC will pay premium time beyond an eight hour shift.

1.3 The Contractor shall provide a minimum of three sets (with one in standby) of test probes and analyzers for conducting the burner air flow balancing. Spare parts, probe and analyzer shall be obtainable within one working day (overnight freight service), upon the event of equipment failure.

1.4 IPSC will provide brackets or jigs for insertion in the coal nozzles to accommodate the test probe assemblies. A minimum of twelve jigs will be provided.

Maintenance support will be provided by IPSC to move the jigs during the air flow testing.

1.5 IPSC will be responsible for the installation of the shrouding required for balancing the the outer air registers. RJM will provide technical support on the installation.

Testing will be conducted, most likely during the night shift, which would allow modifications for balancing to occur during the following day shift.

1.6 An air flow test shall be conducted on one of the burner rows, in final balanced configuration, at minimum secondary air flow to verify balanced flow in a simulated out-of-service configuration.

2.0 PERFORMANCE SPECIFICATIONS

2.1 All eight rows of six Babcock and Wilcox (B&W) dual register low NOx burners shall be balanced to within +/- 5.0% on a burner row basis and +/- 10% on perimeter (circumferential) loading thru each burner.

2.2 Air flow testing will be conducted at normal secondary air flow through the windbox that is being tested.

3.0 CONDITIONS

3.1 The Contractor shall provide initial burner register positions for both the inner and outer vanes and inner register back plate position, prior to the beginning of the Outage. The burner registers will then be preset from the windbox at the beginning of the Outage, prior to testing.

The testing will be conducted with the burners in as close to final setup as possible to simulate actual operating conditions. This will include all register vane positioning, plus installation of the flame stabilizers.

3.2 Parameters outside the control of the contractor will be taken into account, if balancing criteria cannot be achieved. These parameters include: inadequate time to complete retesting and balancing (less than allocated time) and balancing restrictions outside the scope of the burners (such as a windbox configuration that cannot be balanced without installation of straightening vanes, vortex breakers, etc.).

Payment for testing completed shall be on a time and materials basis with mobilization costs.

3.3 IPSC will reserve the right to cancel additional testing and balancing due to time or other an foreseen event.

MEMORANDUM

INTERMOUNTAIN POWER SERVICE CORPORATION

TO: Doug Ingraham

FROM: Dennis K. Killian

DATE: September 30, 1991

SUBJECT: Authorization to Purchase Burner Air Flow Balancing Services on Unit 2

FILE: 01.12.02, 14.9010

Please proceed with the attached purchase requisition for secondary air flow balancing thru the burners on Unit 2 during the Fall 1991 Outage. This Outage is scheduled to begin October 28, 1991. RJM Corporation will conduct the testing and provide diagnostics for shrouding the outer air registers and for back plate positioning on the inner air registers. **Total estimated cost for the burner air flow balancing is $70,400.**

This is a sole source contract due to the unique specialty test equipment and software required to test both the inner and outer air zones of the burner. We are not aware of any other combustion engineering firm, other than RJM Corporation of Ridgefield, CT, capable of performing this type of testing and diagnostics.

IPSC will be responsible for the installation of the shrouding required for balancing the outer air registers. RJM will provide technical support on the installation. We will also be responsible for mechanical and technician support of the testing.

Please reference the attached purchase requisition, burner air flow balancing specification, plus RJM's Proposal #910614 dated June 17, 1991.

Please contact Jerry Hintze or Aaron Nissen if you have further questions concerning this matter.

AEN:
Attachments

[ ] REQUISITION FOR CAPITAL EQUIPMENT

[XX] PURCHASE AUTHORIZATION FOR EXPENSE ITEMS

Date 9/10/91
Req./PA No 61652
P.O. No
Vendor
Terms
FOB
Terms
Ship Via
Conf. To:

Purpose of Materials, Supplies or Services: Burner air flow testing, diagnostics and balancing of the outer and inner air registers during Unit 2's Fall 1991 Outage.

Suggested Vendor: RJM Corporation
Attn: Richard Monroe
Ten Roberts Lane
Ridgefield, CT 06877
(203) 438-6198
FAX (203) 431-8255

Account No. 00-6528-503

Qty	Unit	Description	Unit Cost	Extension
1		Burner Air Flow Analysis on IGS Unit 2 during		$ 34,300
		the Fall 1991 Outage which begins 10/28/91.		
112	ea	Burner Air Flow Balancing & Retesting on an "as	$300	$ 33,600
		needed" basis to meet perf criteria & time requir		
		Reference attached Specifications and RJM		
		Proposal for contract details.		
		Same terms and conditions as the Burner Design		
		Evaluation Contract.		
		IPSC's contact and interface person with RJM shall		
		be Mr. Richard Monroe.		
1		Travel for meetings (expenses plus per diem)		$2,500
		as requested by IPSC.		
		TOTAL ESTIMATED COST		$70,400.

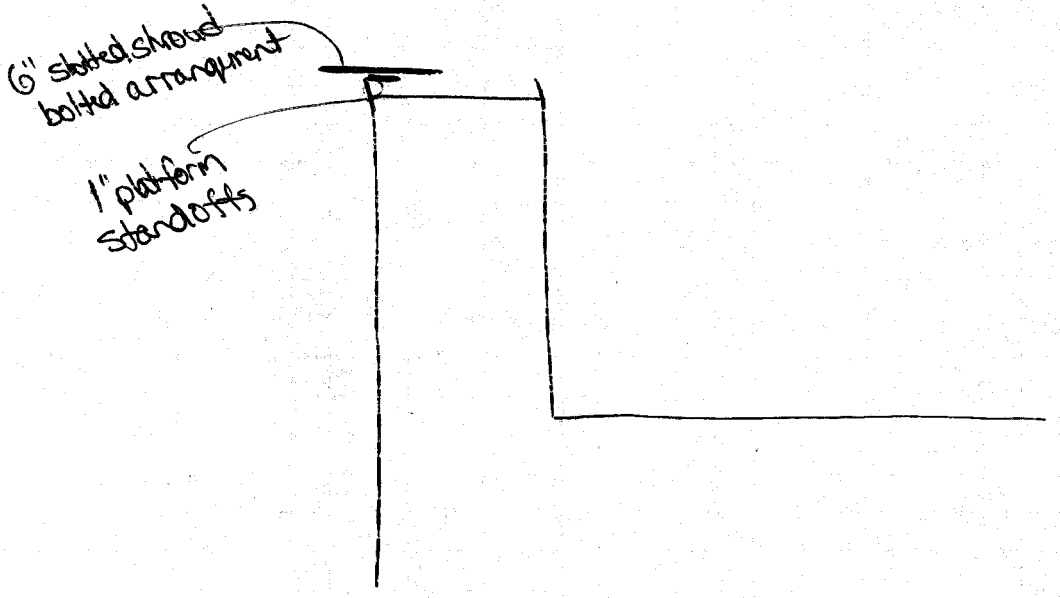
Remarks: Please contact Jerry Hintze or Aaron Nissen with any questions.

Delivery requested by [Date] 10/28/91 Originator Aaron Nissen

Dept. Mgr/Supt. Date | Station Manager Date | Operating Agent Date

9/16/91 Discussion w/ Jim Nelson

Installation of Shroud on Outer Registers
(permanent shielding shroud)



Carve as-needed for ~~diff~~ circumferential loading

Start w/ 1" area reduction to start with

INTERMOUNTAIN POWER SERVICE CORPORATION

PROJECT NO. _____ WO NO. _____ PAGE _____ OF _____

ORIGINATED BY _____ DATE _____ CHECKED BY _____ DATE _____

DESCRIPTION _____

TEST PLAN: AIR FLOW BALANCING

Test Nights: 10 to 12 hour shifts

2 test crews (2 RJM
2 IBC Garry / Dave

- Inner air
- Outer register
(1 backup probe)

Maint Crew Support to move test jigs
(better than (3) or 4 sets made)

Test entire unit (all 48 burners) on 1 backshift

assume: (well 6min - 20min)
10 min/burner × 6 burners = 60 min per row
plus 30 min to move to next row
× 8 rows

Test, Balance, Retest

RJM

- Richard Monroe 9/4/91

recommend ~~test~~ vanes - full open
outer reg influenced

1% error for 10° axial
10% error of inner air flow

segmented windbox

test days
→ banding backshift

- 48 burners 2 crews
8–10 hrs continuous testing
IBC provide 1 tech support

→ Baseline
ductwork modifications, if necessary
predicted by Model

★ Bottom line - How bad you are?

- Fed Ex - Drawing

INTERMOUNTAIN POWER SERVICE CORPORATION

PROJECT NO. _____ WO NO. _____ PAGE _____ OF _____

ORIGINATED BY _____ DATE _____ CHECKED BY _____ DATE _____

DESCRIPTION _____

Scope

Schedule

Mstr
manpower
software
dependencies
Binding IPSC

+/- 3% burner to burner

How
Who
What
When
Where
$
#

Jig

2 tech ?

Min - 2 testing setups

20 hr coverage
4 crews 10hrs

Max duration [ ]

2 brackets/jigs

balance w/ stabilizers in place ?

MEMORANDUM

TO: Mr. Aaron Nissen, Intermountain Power Service Corporation

FROM: Mr. Richard J. Monro, RJM Corporation

DATE: September 4, 1991

RE: Airflow Balancing

Based on our telephone conversation today, I thought the following comments might be helpful to you in your planning:

1. A baseline airflow balance test must be performed on all 48 burners. The baseline test will tell us airflow deviations between burners and between windboxes.

2. After the baseline test has been performed, burners within individual windboxes can be balanced on a windbox-by-windbox basis. Additional full 48 burner tests might be required, depending on individual windbox test results.

3. Airflow testing requires that the air doors and air vanes be set in the full-flow, axial-flow position. Adjustments for swirl control are made after airflow balances have been achieved.

Setup is limited to test w/ stabilizers in-place

4. Testing the inner air zone with the swirler installed introduces test error due to the rotational momentum of the air. Best test results will be achieved by testing the inner zone airflows without the swirler in place.

5. ADA insitu balancing addresses airflow problems symptomatically at the burner level. Ideally, these test techniques and balancing techniques are used for fine tuning the airflow balances. Gross airflow imbalances can be minimized, but a fluids model should then be performed and corrective actions installed during the next outage and final ADA airflow balancing achieved at that time.

6. Balancing using ADA insitu probe techniques are very effective in most applications. However, severe flow disturbances due to ductwork configurations usually require modeling to correct the airflows to the windboxes. A decision will have to be made upon completion of the baseline testing to determine if severe ductwork problems exist and the extent to which ADA balancing should be attempted, if at all.

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7. RJM Corporation can provide two sets of test equipment and two crews for the airflow balancing work. IPSC is requested to supply two technicians for each shift to assist in probe handling.

Babcock & Wilcox

1. B&W has not responded to my memo of August 27, 1991. Don Langley is on vacation. I have asked his secretary to expedite the information we requested. Very shortly we will be unable to proceed with our engineering analysis due to the lack of this information. Could you please apply pressure from your end.

2. We do not have materials descriptions for the 800H metal. Do you have any technical information on this supplied to IPSC from B&W?

RJM/sv
F:\WPDOCS\IPSCAN.MEM

RESPONSE:

Dinflow testing

2 probes

10½ nozzle 3 sprayers

Installation IPS

RCM technical support

Jerry

RJM technical support full time?